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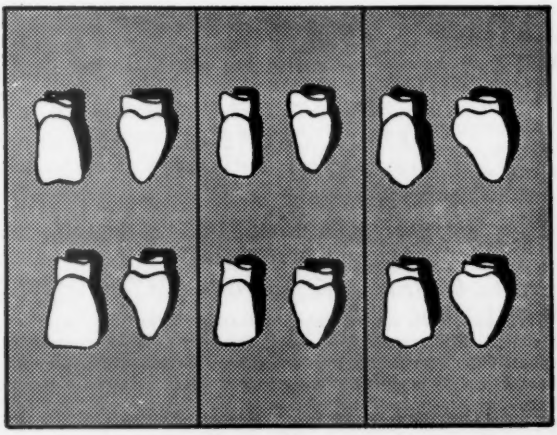

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ACRYLICS QUIZ

METRODENT

FOR YOUR INTEREST

1. IS THERE A 'SUPER-HARD' ACRYLIC?
2. IS BRINELL OF INTEREST WHEN BUYING?
3. DOES PROCESSING AFFECT TEETH?
4. DOES ACRYLIC IRRITATE MOUTH TISSUE, AND WHY?
5. CAN BLEACHING, POROSITY AND SHADE VARIATION ALL BE CONTROLLED?
6. WHAT ARE THE NEW ACRYLIC SHELL CROWNS?

ANSWERS.—(1) As yet, no super-hard acrylic is known. No added substance has yet been found which improves the clinical characteristics. (2 and 3) No, it is possible to compress a dry moulded tooth to a higher Brinell: this hardness disappears on the first processing, thereafter the carefully produced monomer-polymer tooth gives better figures, especially in all-important tensile strength. (4) Yes, if improperly processed—further processing usually cures the trouble—assuming that the basic materials were of good quality. (5) Yes, by painstaking manufacture. Since early 1949, all Metrodent teeth, even posteriors, have been guaranteed against such former main faults—the first FULL-COVER guarantee for acrylic teeth ever to be given. (6) They are pre-formed shells which can by simple technique be fitted as aesthetic crowns to anterior or posterior teeth. Initial hardness is retained as they undergo no further processing. Crown preparation and completion takes an average of 30 minutes. These crowns are excellent for the normal practitioner, but as they allow the 'skimper' to do a 'jacket crown' in next to no time, they may receive criticism which should rather be directed at the man who misuses them. Used with normal care, they have a most useful future role in general practice, and are now accepted practice in many continental countries and the U.S.A.

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BRITISH DENTAL JOURNAL

The Journal of the British Dental Association

VOL. LXXXIX NOVEMBER 21, 1950 No. 10

ORIGINAL COMMUNICATION

AN INVESTIGATION INTO THE PHYSICAL PROPERTIES, HISTOPATHOLOGY AND CLINICAL TECHNIQUE OF THE MOUTH TEMPERATURE POLYMERISING RESINS

BY JOHN W. McLEAN, L.D.S.ENG.

THE F.I.A.T. report No. 1185 published in May 1947 revealed a considerable effort by the Germans to develop a satisfactory acrylic resin suitable for conservative restorations. The subsequent time lapse has revealed the defects in these resins and during the last three years great improvements both in the physical properties and technique of insertion of the self-curing resins have been made.

Two forms of acrylic restoration have been evolved. The first type is the direct acrylic filling, used in the smaller four-walled cavities in the front teeth, and polymerised under pressure into a well undercut cavity. The second type employs an acrylic inlay as the restorative medium. The old conception of an inlay with a cement lute has been abandoned and the inorganic cement is replaced with superfine polymer acrylic resin. The finished acrylic restoration must be regarded as a chemically united plastic mass, the main bulk, the inlay, being pre-polymerised and then locked into an undercut cavity with a mouth temperature polymerising resin.

THE POLYMERS

The German Palapont S.H. (self-hardening) was manufactured from the same material as the Palapont crown and inlay polymers. This polymer was in the range of 80–120 mesh (granules capable of passing through a mesh of 80–120 perforations to the linear inch) (fig. 1).

The physical properties of the 120 mesh polymer were not very satisfactory for conservative restorations. The granules were not easily softened by monomer unless a prolonged initial polymerisation phase was employed, such as in the normal mixing and packing stage for dentures and crowns. The introduction of catalysts which lowered the critical temperature of polymerisation produced a rapid initial "doughing" period of from three to five minutes and the monomer was unable to act as a fugitive active plasticiser. A gritty mix of acrylic was produced which became difficult to manipulate in the mouth. In order to counteract this physical state the operator was tempted to add further monomer in order to soften the granules and the monomer polymers ratios were altered, causing excessive volumetric shrinkage with poor adaptation at the cavo-surface angles.

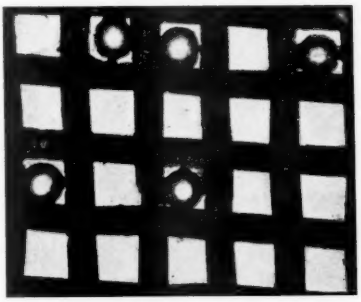

FIG. 1.—120 mesh sieve. Polymer trapped in the mesh. × 60.

In 1948 the Portland Plastics Ltd. solved the polymer problem with the introduction of Portex "Quick-Set" Filcryl. This is a considerable step forward since this polymer was in the range of 1,000–2,000 mesh (fig. 2), and complete saturation of the granules was effected in from two to three minutes, depending upon the room temperature. The resultant plastic mass was easily adapted to the cavity but proved too slow in its initial and finite polymerisation phases. The material was rejected by the profession, but due credit must be given for the development of the superfine polymer. The term 1,000–2,000 mesh is indicative only of the size of this polymer since a mesh of this grade is not

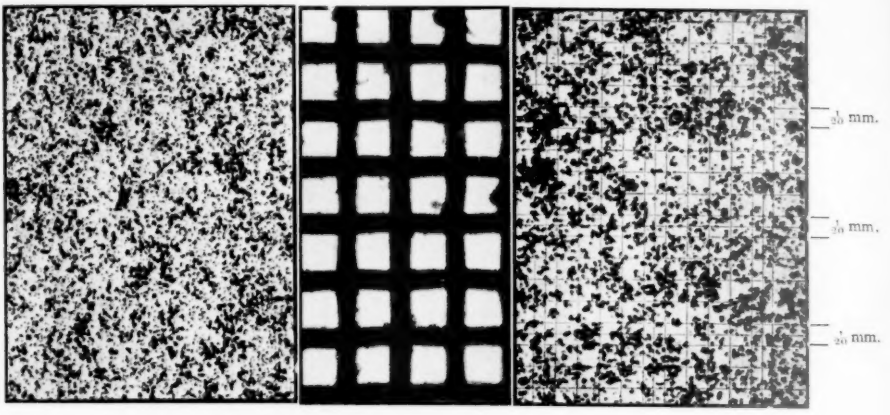

FIG. 2. FIG. 3. FIG. 4.

FIG. 2.—Portex quickset filcryl polymer. 1,000–2,000 mesh. FIG. 3.—200 mesh sieve. × 60.
FIG. 4.—Graticule $\frac{1}{20}$ mm. dentafil 1,000–2,000 mesh polymer.

standard and would be impossible to produce for practical purposes. Comparison with the 200 mesh (fig. 3) shows that the particles fall well within the 1,000 mesh range and the graticule scale (1/20 mm.) provides a good comparative index against standard polymers. Dentafil (fig. 4) is also a 1,000–2,000 mesh polymer. Unsubstantiated claims have been put forward for some American products that a new chemical formula has enabled the preparation of special polymers having particles of irregular shapes and sizes, this type of polymer producing a new and superior filling material. The spheroidal 1,000–2,000 mesh polymers appear to have superior working properties to these irregular particle polymers, since the latter have not changed the basic physical properties of acrylic and in point of fact fail to maintain the smooth manipulative properties of the superfine spheroidal polymers. There is no direct acrylic filling material available today that has superior properties to the standard processed resins ; the only physical difference is the polymerisation time factor, coupled with decreased volumetric shrinkage.

MONOMERS AND THEIR CATALYSTS

The Palapont S.H. monomer was not absolutely pure and traces of acrylic and formic acids were present, showing a slightly acid reaction to pH tests. Monomer being an organic solvent does not dissociate easily and pH tests were done by measuring the pH change in a quantity of normal saline after addition of the known monomer.

NORMAL SALINE pH 6·62	
Type of monomer	*pH change*
Dentafil	5·07
Filcryl	7·85
Vacuum distilled monomer + 10 per cent methyl cyanide	4·36

Pure monomer may be prepared by distillation of commercial monomer in a nitrogen vacuum. Spontaneous polymerisation is said to occur unless the liquid is kept in a cold darkened vessel. A specimen of vacuum distilled monomer was kept in a refrigerator for two years and remained in perfect condition.

Palapont S.H. contained 0·5 per cent benzoyl peroxide in the powdered, polymerised methyl methacrylate, and 0·5 to 3 per cent n-trihexylamine in the monomer. The F.I.A.T. report continues :

" After a brief period of heating (application of so-called heat shock) spontaneous polymerisation of the plastic mass occurs. This polymerisation is not dependent on the rate of heating, it is entirely spontaneous being induced by the catalytic action of the benzoyl peroxide which in turn is activated by the tertiary amine. The presence of tertiary amine lowers the critical temperature of polymerisation. In ordinary Palapont the material hardens from the outside. Palapont S.H., being self-hardening, hardens from the inside, the greatest rise of temperature occurring in the centre."

This last statement is open to question, since indentation tests with a Vickers Hardometer indicate the reverse.

" Filcryl Quick-Set " monomer contains a tertiary amine activator and is a pure and stable monomer. Dentafil monomer is also free from

any impurities and contains an improved catalyst, this accelerator conferring the remarkable cold curing polymerisation time factor of fifteen minutes on the resin. Dentafil is the fastest initial polymerisation phase product available in this country and figures of 80–90 per cent maximum hardness are reached after ten minutes polymerising at mouth temperature.

Monomer Polymer Ratios, Dimensional Changes and Water Imbibition

The change in density from monomer to polymer is 0·945 to 1·19 grm. per c.c. at 20° C. It has been recognised that this change is responsible for the 21 per cent volume change when monomer is converted to solid polymer. The average proportion of monomer to polymer used in a normal mix for the 80–300 mesh polymers is 1 to 3–4 pts., this proportion reduces the volume change of a normal acrylic mix to 6–8 per cent. If a 1,000–2,000 mesh polymer is used the proportion of monomer to polymer is the same by weight but the polymer will occupy a space of twice the volume of the 80–300 mesh polymers. The superfine polymers are more readily saturated by monomer and in practice require less liquid to effect a working dough, the resultant volume change being approximately 3–4 per cent. It must be emphasised that these figures are volume changes and not linear changes. The linear change according to Sweeney is approximately 0·47–0·56 per cent and this is counterbalanced by the 0·5 per cent swelling of the acrylic due to water imbibition. The effect of linear change on the 1,000–2,000 mesh polymers is resultantly lower and preliminary tests carried out on Dentafil show an average linear shrinkage of 0·3 per cent at 37° C. These tests were carried out in a standard brass mould and an improved method is desirable since the coefficient of expansion of brass is difficult to correlate with the end-results. This 0·3 per cent shrinkage is more than compensated by the water imbibition of the acrylic and test pieces have shown slight expansion of approximately 0·5–0·1 per cent, the graticule scale (1/20 mm.) indicating this slight linear increase.

The Initial Polymerisation Phase and Heat Shock

The initial polymerisation phase is the time taken for the monomer polymer mix to reach its packing consistency. This phase is dependent upon the room temperature, the size of the polymer granules, the catalysts employed and, to a certain extent, light. The average denture base material will generally have a working time of ten to twenty minutes at a room temperature of 60–70° F. The time taken during the " doughing period " allows the complete saturation of the polymer granules by monomer.

The initial polymerisation phase of Dentafil is approximately one to two minutes at 50–60° F. This is brought about by the addition of a catalyst to the monomer which acts as a destabiliser on the peroxide in the polymer. The rapid softening of the polymer has been effected by using 1,000–2,000 mesh granules. The Dentafil accelerator is a great improvement over the tertiary amines used in Palapont S.H. and Filcryl, the latter having an initial polymerisation phase of approximately three to four minutes. Here then is a significant development; acrylic resin has been brought into the sphere of the oxyphosphate and silicate cement setting times.

" Heat Shock " is the term applied to the initial application of heat to a rapid curing acrylic resin in order to stimulate spontaneous polymerisation. This initial heat application was necessary with the tertiary amine catalysed resins in order to cut down the time of finite polymerisation. The heat was applied with a hot spatula, thermostatic burnisher or infra-red lamp. The author prefers a thermostatically controlled spatula with various types of removable head. The use of ultra-violet or infra-red lamps is difficult to control over small areas.

Self-curing Resins at Mouth Temperature

The recently introduced resins such as Dentafil and Caulk's product Kadon pass through such rapid initial and finite polymerisation phases at mouth temperature that ten minutes will complete the saturation of most free carbon valencies in the monomers. The only benefit derived from a 70–80° C. heat shock is to cut down the time when free monomer may enter the dentinal tubules and produce a pulpal reaction.

Hardness, its Clinical Significance

Hardness and resistance to abrasion have been much discussed by the physicists. Clinically a material that has a high Brinell hardness figure will resist abrasion. The resistance to abrasion of acrylic is not good and is the major defect in the material. The mouth temperature polymerising acrylics have not improved this property and as tests have shown the Brinell hardness figure drops slightly.

A series of tests was made on various types of resin and employing different curing methods. The results are set out in Table I. These tests were checked by two machines, a Vickers Hardometer and the Herbert Small Brinell

TABLE I.—BRINELL HARDNESS TESTS

Machine employed for tests: Herbert Small Brinell Machine
Load: 5 Kilos. Diameter of Ball: 1 mm.

Type of resin	*Method of polymerisation*	*Hardness Number*
Stellon Dentine	Six-hour cure at 100° C.	27·1
Stellon Denture base ...	Six-hour cure at 100° C.	32·4
Portex Denture base ...	Six-hour cure at 100° C.	30·0
Portex Diadentine	Powder moulded at 160–70° C.	29·8
Portex Diadentine	Dough moulded, two hours at 100° C.	29·8
Dentafil	Mouth temperature cure for ten mins.	23·8
Simplex Pentocryl	Cold cure for fifteen mins.	23·8
Portex Filcryl	Two-hour cure at 100° C.	28·4
Dentafil	Two-hour cure at 100° C.	23·8
Dentafil	80° C. heat shock for five mins.	23·8
Kadon (Caulk's)	80° C. heat shock for five mins.	19·3
Portex Filcryl	80° C. heat shock for five mins.	15·9
Dentafil	70° C. heat shock for three mins.	21·8
Dentafil	80° C. heat shock for two mins.	19·3
Dentafil	120° C. heat shock for three mins., producing micro-porosity	15·9
Portex Denture base + 1 per cent methyl cyanide ...	Two-hour cure at 100° C.	27·1
Portex Denture base + 2 per cent methyl cyanide ...	Two-hour cure at 100° C.	27·1
Portex Denture base + 5 per cent methyl cyanide ...	Two-hour cure at 100° C.	27·1
Portex Denture base + 10 per cent methyl cyanide ...	Two-hour cure at 100° C.	24·8
Portex Denture base + 20 per cent methyl cyanide ...	Two-hour cure at 100° C.	23·8
22 carat S.S.W. Gold Alloy...		158·0
Enamel		248·0
Dentine		69·1
Silicate		40–60

Brinell hardness figures were obtained from B.S.I. No. 240, Part I—1947.

machine. The impression of the steel ball on the resin indicates to a certain extent the properties of flow, and this form of hardness testing gives a good indication of the molecular cohesion in the resin. The measurement of the indentation was carried out immediately after compression by the steel ball.

The average Brinell figure for denture base and tooth resins is approximately 30 and the cold-curing resins Dentafil and Simplex Pentocryl gave readings of 23·8. Clinically the difference in hardness was undetectable and in order to give any sign to the operator of a change, figures of from 10 to 15 difference were necessary. The probable explanation of the lower Brinell figures for the cold-curing resins is that rapid polymerisation produces short chain polymers. The physical significance of this 20–25 per cent decrease in surface hardness should be noted when the Class IV restorations are attempted. Portex Filcryl is a harder resin when cured at 100° C.; the explanation again is that the tertiary amine is a slower acting catalyst and longer chain polymers are formed. However, if equal heat shock is applied to Dentafil (23·8) and Filcryl (15·9) the rapid polymerisation of the cold-curing resin is illustrated; Dentafil showing an increase in Brinell hardness of 7·9.

The optimum temperature for Dentafil, if heat shock is desirable, appears to be 70° C. for three minutes, any further application of heat failing to improve its physical properties.

The F.I.A.T. report states that "in order to increase the abrasion strength of Palapont S.H., it was planned to add acrylic acid amide or acrylic acid nitrile (acetonitrile of methyl cyanide). The figures of experiments carried out on this material show a deleterious effect on the resin, methyl cyanide decreases surface hardness. The reason for using this compound is the presence of the unsaturated nitrogen radicle, since it was planned to cross-link this molecule with the free carbon valency of the acrylic radicle.

Eugenol will act as a plasticiser on acrylic and will soften the filling; on no account therefore should acrylic fillings be processed on to a eugenol zinc oxide base, the latter must be covered with cement first. Phenol also has a deleterious effect on the resin and if this drug is used in cavity toilet, all traces of it should be removed with alcohol.

Porosity

Three types of porosity are recognised:

(1) Gas bubbles due to boiling monomer.

(2) Condensation porosity due to evaporation of monomer during packing combined with lack of pressure.

(3) Pin-point porosity due to voids in the polymer granules.

Gaseous porosity is formed with the direct acrylic filling materials only if excessive heat shock (100–120° C.) has been used. The appearance of the resin is slightly different (fig. 5). The normal type of denture porosity is spherical but "heat-shock porosity" shows an irregular pattern due to the sudden temperature change and great pressure exerted upon a small area, it is not easily visible and will stain readily.

Condensation porosity may be present if the filling material has been incorrectly mixed and inserted, the main defect is the loss of monomer in a warm room. Correctly inserted cold curing resins show no surface defects and the internal structure is identical with that of the standard processed resins (see under cavo-surface angles).

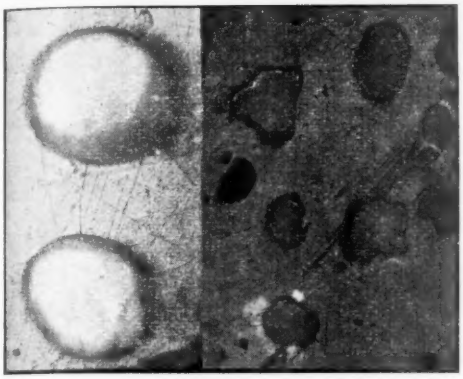

FIG. 5.—Gaseous porosity. Heat shock porosity. × 100.

Pin-point porosity has been eliminated by the use of 1,000–2,000 mesh polymers.

DIMENSIONAL STABILITY

The factors involved in the dimensional instability of acrylic restorations are :

(1) Water sorption—Adsorption.
Absorption.
(2) Thermal change.
(3) Low modulus of elasticity.
(4) Plastic flow.
(5) Continued polymerisation after insertion of the filling.

The water sorption of acrylic is approximately 0·5 per cent after one week in water. This expansion coupled with a thermal change (coefficient of expansion of acrylic at 20–50° C. is 81·0) may have caused the loosening of acrylic inlays cemented with the inorganic cements. However water sorption and thermal expansion are not the main causes of acrylic inlay loss since restorations free of the bite have remained in place for considerable periods of four to five years. Mouth breathers will probably lose cervical inlays fairly quickly, but this represents a most abnormal condition for the average acrylic restoration. The main reason for the loss of acrylic conservative restorations is the low modulus of resilience of the material (22 in lb. per cub. inch), the transmission of masticatory stress, even via hard food particles, to the underlying cement lute has caused fracture and dissolution of the inorganic cements. Plastic flow also contributes towards this eventual loosening.

The substitution of superfine acrylic polymer resins for the inorganic cements has largely solved these cementation problems. Masticatory stress will cause an impact shock to the fillings but the resilience of the acrylic cement will take up the elastic stretch of the inlay—as the author demonstrated in 1948. Clinically no voids are detectable in the cavo-surface angles of the inlay and the acrylic is capable of withstanding dehydration.

The direct acrylic fillings (Filcryl and Palapont S.H.) continued to polymerise for a few hours after insertion of the resin and the marginal fit of these acrylics was not good, slight shrinkage and subsequent leakage frequently marring the filling. Dentafil and Kadon have overcome this defect since polymerisation is completed, from a clinical standpoint, after ten minutes at mouth temperature.

THE CAVO-SURFACE ANGLES

The restoration of tooth enamel is a difficult problem. No material has been developed that produces a perfect æsthetic result and silicate and porcelain fillings have never achieved more than a temporary success. Cohesive gold shows excellent adaptation, and is probably ideal except for its colour and difficult technique. Silicates will adsorb and absorb oral stain, whilst porcelain inlays frequently stain round the cement lute. The clinician has often noticed the staining of cracks in the enamel and it must be recognised that this mechanical defect is one that is certain to occur when two surfaces are brought into apposition. The property of adhesiveness may be present in the filling material but the microscopical junction line between any filling material and enamel provides a fissure in which stain can lodge. Some mouths are less likely to stain these fissures than others and are often regarded as " good silicate mouths." The jacket crown is a drastic but effective answer to these problems.

The acrylic direct filling or directly polymerised inlay, whilst exhibiting no adhesive properties, will provide an impermeable surface and microscopically a better edge than the porcelain inlay, but the fissure line between acrylic and enamel will, in some mouths, stain readily.

Serial sections were cut through 40 teeth containing direct acrylic fillings (Dentafil), maintained at 37° C. in a water bath. Comparative photomicrographs were then taken with a metallurgical microscope with vertical illumination. Fig. 6 shows a comparison between a crack in the enamel and the junction line between acrylic and enamel, this illustrates the susceptibility of both junction lines to oral staining. Fig. 7 is another view of the cavo-surface angle, the comparative width of these junction lines should be noted as the depth of

each section progresses. Fig. 8 is a section cut at the amelo-dentinal junction level. The junction line between dentine and enamel is of interest. Orban states that "the function of the dentino-enamel membrane is probably that of cementing the enamel to the dentine: It calcifies soon after its formation, similar to the interrod substance." The scalloped effect of the enamel-dentine edge is said to be part of this cementation device. Exposed dentine will, however, stain around its junction with enamel and it seems likely that the two surfaces are in close apposition but are not forming a homogeneous mass. The marginal adaptation of the acrylic is still good at this level but the difference in surface hardness between acrylic and enamel will eventually leave the enamel proud and once again stain may lodge there. Fig. 9 is an experimental acrylic-amalgam composite filling, the amalgam being used merely for comparative purposes. The adaptation of the amalgam at the cavo-surface angles is better than the acrylic, since the alloy is harder and maintains equal polishing levels with the enamel. This fact alone should contra-indicate the use of acrylic in posterior restorations. Fig. 10 is a view of the dentinal base of the filling, it is interesting to note the similarity between this view and the enamel surface.

FIG. 6.—E—Enamel. C—Crack in enamel. A—Acrylic. × 100.

FIG. 7.—E—Enamel. A—Acrylic. × 100.

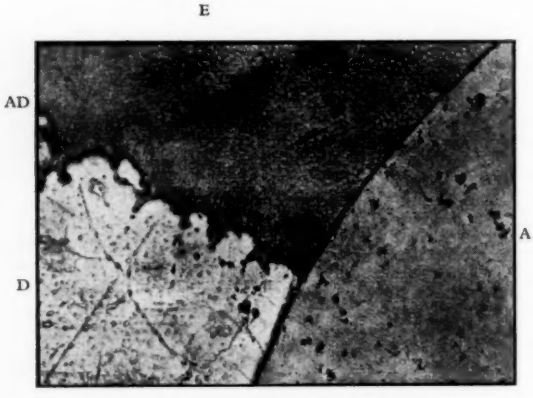

FIG. 8.—E—Enamel. AD—Amelo-dentinal junction. D—Dentine. A—Acrylic. × 100.

All these sections were stained at each level with a weak solution of gentian violet dye and the stain penetrated the enamel cracks but no leakage occurred at the acrylic enamel-dentine margins. The acrylic fillings were dried in air at 70° F. for two days and then immersed again in dye at 37° C. for twenty-four hours, once again no leakage occurred. A concentrated solution of triple dye will, however, penetrate the cavity edges and stain the dentinal base of the inlay, in this case, however, the enamel cracks stain readily and penetration of the amelo-dentinal junction will occur. The acrylic did not discolour but the amalgam remained impermeable at the cavo-surface margins.

FINISHING AND POLISHING

The use of carborundum stones, even run under water, is deprecated with acrylics. The photomicrograph (fig. 11) illustrates the damage caused by carborundum stones. If an acrylic filling is dehydrated in the mouth after use of carborundum, a white line is frequently visible around the edge of the filling. If the filling is moistened this line disappears. In the photomicrograph the area EP shows a line of fractured enamel prisms. These prisms if kept moistened do not show up since the refractive index of the enamel has not been disturbed. The resultant effect of this powdered enamel edge is that stain is retained very readily.

Slow-running sharp-finishing burs have proved to be the best instruments for finishing the direct acrylics. The subgingival areas are trimmed with diamond files, Rhein files, linen strips or

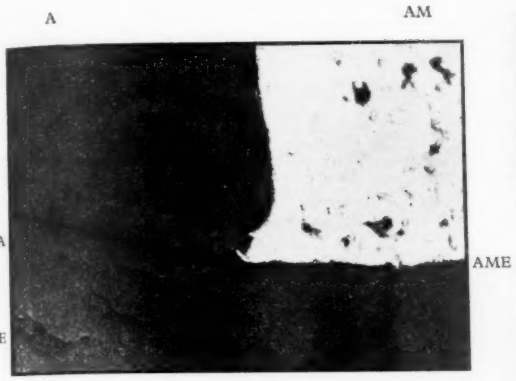

FIG. 9.—A—Acrylic. AM—Amalgam. AME—Amalgam enamel junction. E—Enamel. EA—Enamel-Acrylic Junction. × 100.

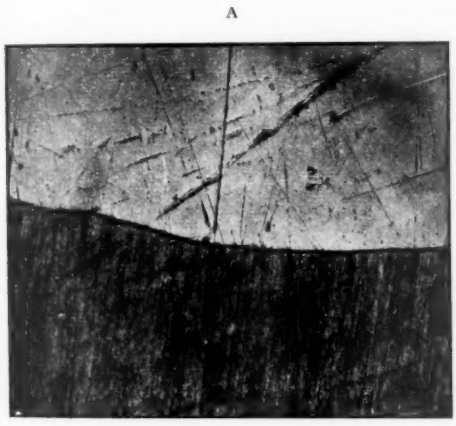

FIG. 10.—A—Acrylic. D—Dentine. × 100.

flame-shaped plug-finishing burs. It must be emphasised that the low Brinell hardness of the acrylics may produce enamel edges if the filling is overfinished, and this is a common defect in the material.

Polishing with any form of brush should not be attempted. Fig. 12 shows a view of a brush-finished direct acrylic. The left half of the surface has been etched with acetone and this has removed the Beilby veneer revealing the deep scoring of the brush marks. Fig. 13 is a view of a direct acrylic finished with a rubber cup (Davis type), the etched area shows a more uniform result, the polishing agent being pumice and glycerine ; the final finish being produced with magnesium oxide and water.

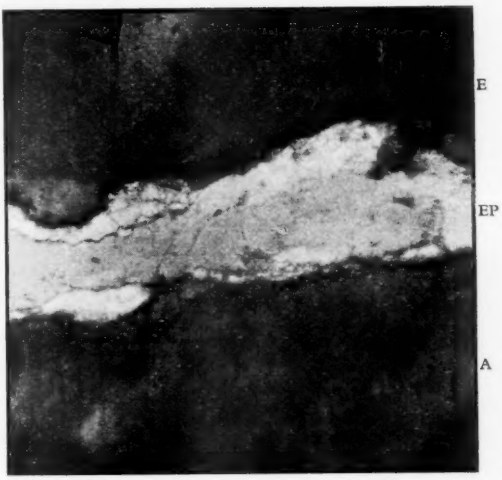

FIG. 11.—E—Enamel. A—Acrylic. EP—Fractured enamel prisms. × 165.

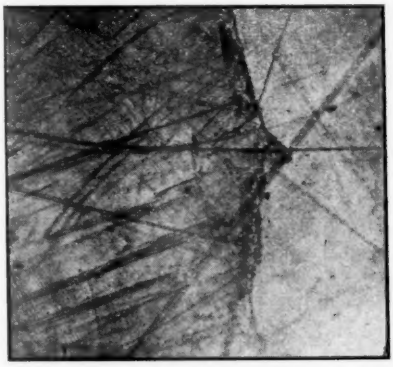

FIG. 12.—Brush polish, left half etched with acetone. × 100.

CLINICAL INDICATIONS FOR THE USE OF THE SELF-CURING RESINS

The self-curing acrylics should only be used for æsthetic purposes, the low Brinell hardness, plastic flow, inadequate sheer strength and impact strength making them highly unsuitable for posterior restorations, except as buccal veneers. The most advantageous use of the direct acrylic is on the interstitial cavity in the front teeth. Silicate restorations are water soluble and Skinner states that they should not be classed as permanent fillings ; porcelain inlays are not very suitable for the small interstitial cavity since too much tooth tissue has to

FIG. 13.—Rubber cup polish, left half etched with acetone. × 100.

be removed and also the labial fit of the porcelain leaves much to be desired. Class V cavities may also be restored satisfactorily with either a direct acrylic filling or acrylic inlay polymerised into the cavity. A Class IV incisal tip cavity may be restored with a directly polymerised acrylic inlay, but this type of inlay must not be regarded as permanent. Thirty of these incisal inlays have been under observation for two years and they have withstood masticatory stress and dissolution better than the previous silicate fillings, and what is far more to the point, the patients have expressed satisfaction with them, having based their opinions on the unsatisfactory nature of previous silicates, most of which had been inserted under rubber dam. This type of incisal inlay has yet to withstand the test of time, and the porcelain or gold-backed acrylic jacket crowns are obviously a better substitute, but the acrylic should find a place in the armamentarium of the operator who has to consider the radical removal of tooth tissue and the economics of the patient.

HISTOPATHOLOGY

The pulpal reaction to acrylic resin fillings is dependent upon the activity of free monomer, the latter being a tissue irritant. Thirty-five human teeth have been filled with various self-curing acrylics, employing both heat shock and cold-curing methods of polymerisation. Controls of oxyphosphate and zinc oxide were used. It is the stage at which the filling is inserted where most pulpal damage is caused and if finite polymerisation is delayed, the toxic sequelæ may overwhelm the pulpal defensive mechanism.

The tertiary amine catalysed resins produce marked, and in many cases irreparable, damage to the odontoblasts. Filcryl "Quick-Set" has a prolonged initial and finite polymerisation phase (three to six hours). During this time single molecules (monomers) appear to penetrate the freshly cut dentinal tubules and the following pulpal reaction takes place :—

The predentine narrows indicating an interference with function of the odontoblasts.

Sheaving of the odontoblasts occurs and œdema vacuoles form in between them.

After one week the tooth may be hyperæmic and in every section examined the blood vessels were engorged and in some areas, especially just beneath the odontoblastic zone, the vessels had ruptured, producing an extravasation of blood cells (fig. 14). Three weeks later the odontoblasts had torn away from the dentine and large œdema blisters appeared in relation to the cavity area of the pulp (figs. 15, 16). These blisters are visible macroscopically.

FIG. 14.—$\overline{5}$ | Occlusal cavity. Dentine penetration 2 mm. Filcryl inserted one week. Cold cure. Early signs of pulpal hæmorrhage, with a narrowing of the predentine. × 120.

Three months later the œdema blisters were still present and early fibrotic changes were visible in the connective tissue of the pulp. The photomicrographs illustrate the toxic effect of methyl methacrylate monomer.

It is possible that Dentafil will overcome this toxic effect since the time left for free monomer penetration down the dentinal tubules is very

limited. Preliminary sections of teeth in which this resin has been used are most encouraging, no œdema blisters being formed. There was, however, a moderate hyperæmia in relation to the odontoblasts under the cavity. The odontoblasts were well preserved on the whole, though at one place the predentine layer was almost missing—indicating some interference with their function. A more detailed report is pending.

It would seem advisable to line all cavities until the safety of these new resins has been established.

FIG. 15.—$\overline{|5}$ Occlusal cavity. Dentine penetration 2 mm. Filcryl inserted four weeks. Showing large œdema blister in relation to the cavity. Heat shock applied for 3 minutes. × 120.

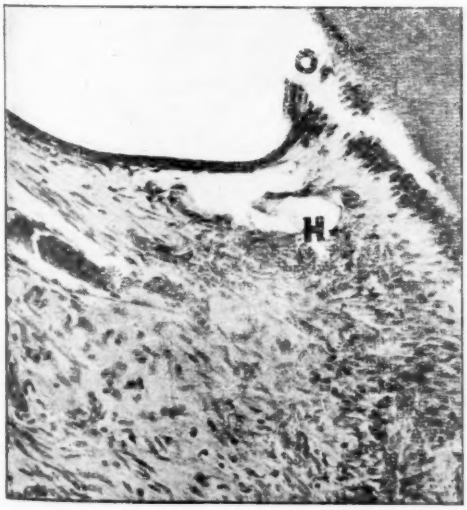

FIG. 16.—$\overline{|5}$ Occlusal cavity. Dentine penetration 2 mm. Filcryl inserted four weeks. Heat shock applied for three minutes. Odontoblasts (O) torn away from dentine and there is also a pulpal hæmorrhage (H). × 340.

CLINICAL TECHNIQUE

The following techniques were developed from use with a self-curing acrylic polymerising in ten minutes at mouth temperature. Two resins fulfilling these requirements are Dentafil and Kadon.

The Class III Cavity.—Rubber dam is a most useful aid to the successful acrylic restoration and it is essential for the subgingival cavity.

Fit a pressure matrix (fig. 17). Restore the

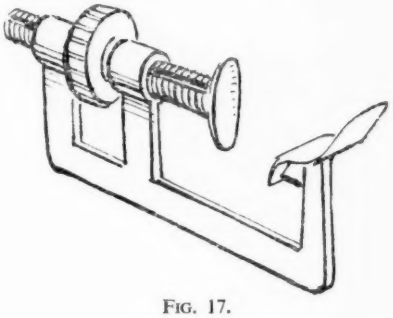

FIG. 17.

contour of the tooth with a temporary cement prior to taking the impression. Fill each impression tray with impression composition and smear the surface with vaseline. Flame the composition so that a smooth soft surface is formed and apply one of the trays to the palatal surface of the tooth. Screw the matrix into position so that both trays mould the composition over the tooth surface. Chill with cold water and remove the matrix adaptor. Retain in cold water, until ready for use.

Prepare a standard silicate cavity but avoid any bevelled edges. Cut additional retention locks with a No. 1 or 2 wheel bur.

Dry the cavity and paint a thin mix of quick-setting zinc oxide over the exposed dentine and remove any excess with cotton-wool. Cover the zinc oxide with a thin layer of oxyphosphate cement.

Mixing.—Use a stainless steel spatula and chill the glass slab. A water bottle type glass

slab with thermometer inset is preferable, a temperature of 50° F. being suitable for Dentafil. The cold slab retards the initial polymerisation phase and ensures the operator adequate time to spatulate the mix. Place two heaps of polymer on the slab and form a crater in one of them. Add the monomer drop by drop using an all-glass hypodermic syringe ; the polymer should just be saturated. Mix in further polymer from the second heap until a plastic paste is formed. The primary object of the mix is to wet the powder particles with liquid, and therefore the metal spatula should be used with a folding and patting action. Additional monomer may be added to the mix within the first thirty seconds, but do not attempt to soften a rubbery mix with monomer, since this will cause excessive shrinkage.

The Initial Polymerisation Phase.—Stage I : 10 seconds. A gritty mix is formed with the monomer flowing readily over the polymer, the whole mass remains fairly fluid.

Stage II : 10–20 seconds. The polymer granules are softened by the monomer and surface disintegration takes place. The mix feels tacky.

Stage III : 30–60 seconds. A plastic paste is formed, the acrylic remains slightly tacky, but is capable of easy manipulation. This is the packing stage.

Stage IV : 1–2 minutes. Free monomer is finding a molecular linkage and short chain polymers are forming. The acrylic is reaching a rubbery consistency and the mix is unworkable. Do not attempt to fill the cavity at this stage, since finite polymerisation is commencing.

Insertion of the Filling : Fit a cellophane strip round the cavity and then fill the acrylic injection gun (fig. 18) with the acrylic at Stage III in the mixing. Inject the filling material into either the labial or palatal side of the cavity.

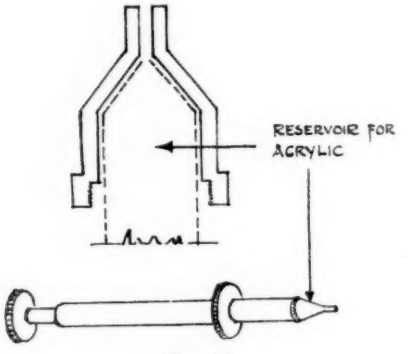

FIG. 18

Adapt the cellophane to the palatal surface and press the palatal matrix adaptor tray with its composition impression over the tooth. Acrylic will flow out through the labial surface of the cavity. Allow the acrylic to enter the rubbery stage and then pull the cellophane over the labial surface. Screw the pressure matrix slowly into position and leave in situ for eight minutes. Do not allow the acrylic to come into contact with the composition.

Tin foil may be adapted to the tooth prior to cutting the cavity and the foil will adhere to the composition and act as a separating medium during polymerisation.

Remove the matrix holder and allow the acrylic filling to polymerise for a further two minutes.

Trim the filling with pear-shaped and flame-shaped plug-finishing burs, clear the gingival area with diamond files, Rhein files and linen strips. Polish with rubber cups, pumice and then magnesium oxide.

The Class III Cavity Heat Shock Technique.—Cut a standard cavity and insert the lining.

Fit a thin stainless steel matrix band to the tooth and wedge the gingival area with a wooden peg.

Warm a small piece of impression composition and press firmly over the palatal surface of the matrix band and hold in position.

Inject the acrylic filling into the cavity via the labial aspect.

When the acrylic has just reached a rubbery consistency pull the labial surface of the matrix band over the tooth (fig. 19).

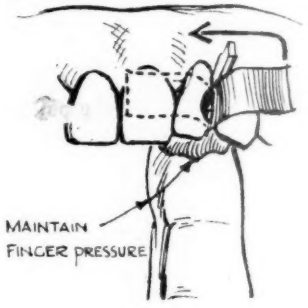

FIG. 19.

Apply a 70° C. heat shock for three minutes to the labial steel band with a thermostatically controlled spatula.

Remove the matrix band and trim and polish the acrylic.

The Class V Cavity.—The Direct Acrylic Filling : A direct acrylic is inserted either with

the pressure matrix and then allowed to polymerise at mouth temperature or alternatively the thermostatically controlled spatula with cervical adaptor fitted is used to pressure-polymerise the filling (fig. 20). Cavity prepara-

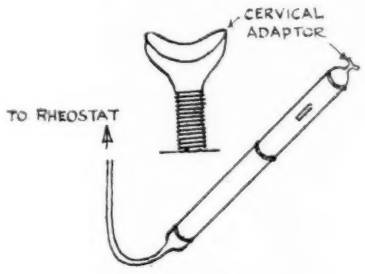

FIG. 20.

tion and insertion of the filling is carried out in the same way as for the Class III restorations.

The Acrylic Inlay : The acrylic inlay (B.H. 30) will resist abrasion in the cervical cavities better than the direct acrylic (B.H. 23·8).

Prepare and line a standard inlay cavity.

Overbuild the wax pattern or alternatively employ the indirect method.

Undercut the cavity with a No. 2 wheel bur and insert a temporary filling.

Process the acrylic inlay by standard technique.

Cover the fitting surface of the inlay with acrylic resin at mixing Stage II and then overfill the cavity with the resin at Stage III.

Press the inlay very firmly into the cavity and maintain pressure for three minutes.

Cover a piece of warm composition with cellophane and adapt over the inlay surface. Maintain pressure for a further three minutes.

Trim the inlay with finishin ' s and polish.

The Class IV Incisal Restoration.—Techniques similar to the one described have become popular on the Continent and in America. Insufficient time has elapsed to indicate clearly the value of the incisal acrylic restoration and at first sight the low figures for abrasion resistance would contra-indicate the use of the resin in such circumstances. However, a replacement of the silicate restorations is desirable and the acrylic may well do this, even though it may never be classed as permanent.

Prepare a standard silicate cavity and line it with cement, provide additional retention with wheel burs, especially in the gingival area.

Select a suitable cellulose acetate crown form and cut it to fit and cover all the cavity margins. Trim the gingival area with great care since bleeding may occur if the tissue is traumatised and it will be impossible to insert the filling.

Drill a small hole in the crown form in a position just labial to the contact point so that the nozzle of the acrylic injection syringe will just fit.

Fill the crown form with acrylic and also press the resin firmly into the undercuts of the cavity.

Press the crown form into place and wedge the gingival area (fig. 21).

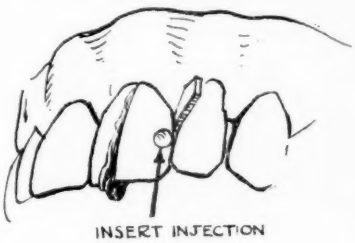

FIG. 21.

Trim away excess acrylic and inject a little more of the resin into the crown form. Maintain finger pressure for eight minutes, or alternatively adapt the pressure matrix over the crown form.

Remove the crown form and trim and polish the restoration.

The Incisal Acrylic Inlay.—The acrylic inlay is preferable for the incisal restoration since perfect contour is assured and also the surface is harder. The clinical value of this type of filling has been described previously.

Cut the cavity so that the wax pattern may be withdrawn from the incisal. Block out any undercuts with lining cement, this may be removed later to provide additional retention. The cavity should provide bulk for the restoration and thin lingual keyways should not be attempted.

Take a wax pattern, or alternatively a hydrocolloid impression, of the cavity.

If hydrocolloid has been used process the inlay directly into the stone model. If a wax pattern has been taken use standard techniques.

Undercut the cement lining, extend the gingival lock to a depth of $\frac{1}{2}$ mm., and make sure that the incisal area is undercut.

Cement the inlay as described for the Class V restoration, but steady pressure must be maintained from the incisal. Clear the gingival excess before finite polymerisation sets in. The labial cavo-surface angle may be improved by applying a steel matrix band over the junction line and burnishing this area with a 70° C. thermostatic

spatula for two minutes. This will provide a smooth surface veneer.

Check bite clearance. Trim and polish the inlay.

The Porcelain Inlay.—Class III or Class V porcelain inlays may be cemented with the self-curing acrylics. Fixation is permanent and the improvement in æsthetics is marked. Theoretically there would appear to be no adhesion of the inlay to the acrylic, but the mechanical locking of the surface irregularities has more than compensated for this feature.

Technique : Undercut the cavity with a wheel bur and roughen the fitting surface of the porcelain inlay with a knife-edge stone. The cavity must be lined.

Prepare a thin mix of acrylic and fill the cavity to excess. A thin mix must be used otherwise the inlay cannot be seated.

Dip the inlay into the acrylic on the slab and transfer it to the cavity. Ensure that the inlay is seated and maintain pressure for two minutes.

Prepare a mix of acrylic resin so that it forms a plastic paste. Cover the inlay surface with the resin and compress with a piece of cellophane-covered warm composition.

After eight minutes trim away the excess acrylic from the inlay edges with a flame-shaped plug-finishing bur. Polish with magnesium oxide and rubber cups.

Self-curing acrylics are more adaptable during the mixing stages than the silico-phosphate cements. The latter material has proved difficult to manipulate due to the necessity of maintaining the acid gel in perfect condition. Acrylic has a wide range of texture suitable for cavity placement providing the operator recognises the change from the initial to the finite polymerisation phase. The finite stage has been described as a rubbery texture progressing to final maximum hardness. Disturbance of the filling during this phase is most detrimental since polymerisation has progressed so far that the monomers are forming a molecular pattern possessing an "elastic memory" capable of withstanding distortion.

The development of the self-curing resins is an illustration of the versatility of the organic compounds and of the potentialities in the unsaturated molecule.

ACKNOWLEDGMENTS

I am indebted to Professor M. A. Rushton, Guy's Hospital, for his advice with the histopathological section and to Mr. J. F. Dudley, A.I.M.L.T., for the preparation of the pulpal sections and photomicrographs of the polymers. My thanks are also due to the metallurgical department of the Royal School of Mines for the use of their apparatus in the preparation and photography of the acrylic filling sections. Mr. D. J. Anderson tested the monomers for pH values.

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Practical Note

UNIVERSAL GINGIVECTOMY KNIFE USING BARD-PARKER BLADES

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The difficulty of obtaining suitable gingivectomy knives, and the rapidity with which knives become blunted in use as they touch the teeth, led to the development of the knife described. This makes use of standard Bard-Parker type blades which are held in the knife holder at an angle of 22 degrees and project at right angles to the shaft. The first patterns were made with an adjustable head, but in use it became clear that a fixed head at the correct angle was capable of reaching every possible region of the mouth.

Advantages.—It is a great facility to have immediately available a store of sharp blades so that as the blade in use becomes dulled a new one can be inserted at once. If this is done, as it should be in every case, the tissues can be incised cleanly leaving a perfectly smooth surface which heals rapidly and gives little post-operative pain. Packs may usually be removed in seven days.

Further the introduction of this knife relieves the surgeon of the need for a multiplicity of different-shaped knives because the one knife will reach adequately, and at the correct angle of bevel, all regions.

Description of Knife.—The knife consists of a blade-holding head 6 mm. square, slotted to take the shank of the blade and tapped to admit an Allen grub screw which is turned by the standard hexagonal Allen key (fig. 1).

The head is fixed to a shaft 14 cm. long, to carry the blade at an angle of 22 degrees to the shaft and with a projection over the shaft of 1·5 cm. in order that the blade may be carried down over the anterior teeth when in use on palatal or lingual aspects (fig. 2).

Blades.—The No. 15 Bard-Parker blade is ideal ; the normal shank must be broken off by holding the cutting part of the blade in pliers and easily snapping

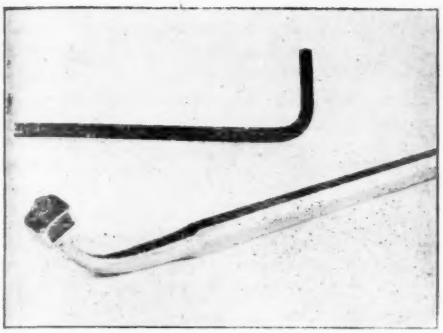

FIG. 1.—Knife holder and key.

FIG. 2.—Assembled knife in use.

off the shank at the correct point to give a blade 12–15 mm. long, which when fixed by the set screw gives a blade projection of 6–9 mm. This projection may be varied according to the needs of the operator.

In Use.—The blade is fixed to project from either side of the knife, according to the region to be operated on, by means of the set screw and key with the sharp edge towards the handle. The gingiva is then incised from behind forwards in the molar and premolar regions, working the blade carefully round the necks of the teeth and interdentally.

Inside the upper or lower incisors the operator should stand to the right of the patient in the position for the extraction of lower right premolars, bringing the blade round from left to right as far as can be reached and then, changing position to front of patient, cutting back from right to left with the blade projecting on the other side of the knife.

All easily accessible parts are operated on with the standard Bard-Parker handle and No. 15 blade. When all incisions have been made on both sides the gingival margin should be raised from the teeth, using a stout, sharp, sickle scaler to free the cut tissue interdentally and lift it from the teeth.

The knife is in production by the Amalgamated Dental Co. Ltd.

Orthodontic Notes

An Answer to Some Criticisms of Treatment Following Extractions of Premolars

THERE is a limit to the extent to which the orthodontist can create tissue changes. Some have ignored these limitations and continue to expand severely crowded arches when there is not sufficient structure to accommodate the teeth. Others have gone to the opposite extreme and extracted teeth too frequently with disastrous results. In addition to questioning the validity of the principles of extraction, there have also been a number of criticisms of results of treatment after extraction ; the most common are : (1) The teeth have not been moved parallel but tipped together—resulting in pocket formation. (2) Loss of bone structure in the extraction area, causing ageing of the denture. (3) Failure to close completely and hold the contacts at the point of extraction. (4) The extraction has left the face deficient in the denture area. The author says he has seen all these conditions but also many cases where they did not occur. In 100 consecutive cases teeth were extracted in 38. 32 of the cases had extreme narrowness of the arches in which the denture was not protrusive.

Teeth can be moved after extraction without extensive tipping and pocket formation ; the space may be closed without excessive loss of bone. It is necessary to have the third molars present in cases in which teeth are extracted to assist in keeping the contacts closed, except in extremely crowded arches. When the denture is not protrusive, it may be desirable to obtain more forward movement in the molar area.—BUCHNER, HOWARD J. (1949) *Angle Orthodont.*, **19**, 23.

Sliding Sleeve Attachment.

THIS attachment is for use with twin anterior labial wire with end tube sections. The labial wire carries round sliding sleeve tubes which engage open tubes on incisor bands. The sleeve is the same length as the open tube and is inserted into it from the end of the open tube. A slight pinch of the latter after the sleeve has been inserted ensures adequate friction to hold the sleeve in the open tube. When a coil spring is used on the twin section, it will engage against the end of the open tube and not push the sleeve beyond the tube. The advantage is that when the arch wire is disengaged from the open tubes on bands by sliding the sleeves out, they remain on twin section, facilitating easy replacement. It is hoped to have an oval open tube made which would reduce the labial thickness.—YOST, H. (1950) *Amer. J. Orthodont.*, **36**, 58.

BRITISH DENTAL JOURNAL
NOVEMBER 21, 1950

PUBLIC RELATIONS

FOR the last two years and more the dental profession has been " in the news." A profession working within the narrow confines of waiting room, surgery and workshop, entering but rarely into public controversy, seldom celebrated in prose or verse and, on the whole, generally content to work hard in decent obscurity, has suddenly found the searching light of newspaper publicity turned upon it. The experience has been unusual and unwelcome. The publicity has consisted, in the main, of newspaper reports of the remarkable earnings of a minority of the profession, of the alleged misdoings of a smaller minority or of statements, often detrimental, by members of His Majesty's Government. The fact that most of this publicity has been unfavourable has, as was to be expected, caused concern. The apparent inability to obtain the publication of any adequate counter-propaganda has resulted in dissatisfaction on the part of the ordinary member of the Association, which has found its natural means of ventilation in comment at meetings and in correspondence to Association headquarters. It is little consolation to the ordinary, honest, conscientious dentist to be told that he has no " news value " from the point of view of the Press or the general public, while his exceptional, dishonest and unscrupulous confrere is worthy, from the journalistic point of view, of a headline in large type and a cynical editorial comment. Yet this is true. Perhaps the only satisfaction is in G. K. Chesterton's remark that he welcomed the sensational reports of divorce scandals because they were, in themselves, proof that the great majority of marriages were successful and happy. It is only the exception which is noteworthy.

This, however, is at best only half an answer. It ignores the fact that reiterated statements to the detriment of the profession, especially if they are at best only partly true, do affect the outlook of the lay person. Nor does it say anything at all either of counter-propaganda or of any other active steps which can be taken to restore and maintain the good name of the profession with the public. The former can only be dealt with by patient correction. Not every paper will correct an inaccuracy and only a small part of those who read a scare headline will notice a correction in the small type of *Letters to the Editor*. Still more difficult is it to deal with the statement which distorts the whole picture by unduly emphasising one small part and ignoring the rest. There is, however, this satisfaction that repeated emphasis of this sort does eventually defeat its own ends. To the casual visitor, the noise of the textile mill is deafening ; the operator is quite indifferent to it.

It is possible to be too sensitive to newspaper comment. Dentists have so lately come into the news that the profession is probably unduly impressed by it. Both history and personal experience support the view that criticism seldom does permanent harm and never kills. The hypocritical cleric and the dishonest public servant are at least as old as classical comedy, but neither the Church nor the Civil Service shows any signs of immediate dissolution. The medical profession has been under constant bombardment by a variety of critics for centuries but the number of doctors on the Medical Register increases steadily and the status of the medical profession is at least as high as ever. It may well be that, apart from the correction of actual mistakes of fact, the profession will do best to ignore these attacks.

The most effective means of combating false news is, beyond all doubt, the issue of news that is accurate. In this, however, the profession is at present greatly handicapped—it has little that is new or sensational to report. It is clear that the Press is receptive to news of general interest on professional matters. The widespread publication of news and comment on the Association Annual General Meeting is proof of this if any were needed. The extraordinary interest shown in the Association's policy at the time of the National Health Insurance Scale of Fees breakdown and, more recently, at the institution of the National Health Service, is further evidence. By purchasing advertising space it is, of course, possible to obtain publicity for the views of any organisation or profession. The real value of such publicity is, however, open to a good deal of question. Major campaigns,

costing many thousands of pounds, have for example been waged against the nationalisation of one industry or another. They have hardly affected the result and, which is more important, they seem to have made little appreciable difference in public opinion. As a gesture, they may have been effective, but their practical value is much less easily demonstrated. In the long run, the building up of goodwill which, with the dissemination of information, is the main object of public relations is the concern not of one individual or one committee. It is rather the immediate interest of every member of the profession. Within the narrow confines of the surgery, every dentist has an unrivalled opportunity to secure the goodwill of his patient. Every patient who, by the courtesy, efficiency and unremitting attention of his dental adviser, leaves the surgery with a sense of satisfaction and well-being is the best of all counter-propaganda, and the most effective and permanent way of maintaining the honour and dignity of the profession.

NOTES AND COMMENTS

Changes in the Representative Board

One of the first actions of the Representative Board at their recent meeting was to co-opt Mr. L. E. Balding as a member. Mr. Balding has for so long played a prominent part in the work of the Council and the Representative Board that some members may well have been surprised to learn that he was a member of the latter by virtue of his office as Hon. Secretary of the Southern Counties Branch. They, too, may have wondered how one man could have found the time and energy to carry out the multifarious duties that devolve on the secretary of a large branch in addition to discharging the onerous responsibilities he shouldered as Chairman of the Health Acts Committee and as a member of the Council of the Association. Professor F. C. Wilkinson vacated his seat on the Board as representative of the East Lancashire and East Cheshire Branch in consequence of his departure from Manchester to take up his new post as Director of Dental Studies of the Institute of Dental Surgery at the Eastman Dental Hospital. The Board also learnt with regret that Mr. C. W. Nicholas had resigned. During the twenty-one years that Mr. Nicholas had been a member he rendered invaluable service to the Central Counties Branch and to the Board. The Board extended good wishes to him in his retirement at Malvern.

Sir Ernest Graham-Little

Sir Ernest Graham-Little, who died last month at the age of 83, had been a member of the Senate of the University of London since 1906, and a member of the Court since 1929. A distinguished dermatologist he was best known to the dental profession and the public generally as Member of Parliament for the University. First elected as an independent candidate in 1924, he was re-elected at successive elections by steadily increasing majorities, his membership only being terminated at the last General Election when the University Seats were abolished. As a member of the House of Commons, he made a special study of the effect of legislation on medical and dental practice and education, and took a prominent part in the debates in the House when professional matters were under discussion. The views he put forward in his speeches and in numerous letters to the Press always carried weight. This was a reflection at once of the integrity of his character and of the pains he took to make himself acquainted with every aspect of the matters under discussion. This was exemplified in the contributions he made to the discussions in the House of Commons on the dental provisions of the National Health Service Act.

Sir Humphry Davy and Nitrous Oxide

On Friday, October 27, the Lord Mayor of Bristol unveiled a tablet on the house, 6 Dowry Square, where the great scientist discovered N_2O during his experiments with gases 150 years ago, and in this way laid the foundation stone on which anæsthesia for the relief of pain in surgical operation has been built. On the same day Dr. F. F. Cartwright gave a lecture on Sir Humphry Davy and his Historical Connections with Bristol. An interesting contemporary comment on the discovery occurs in a letter written by Maria Edgeworth from Clifton in 1799 in which she says " A young man a Mr. Davy at Dr. Beddoes who has applied himself much to chemistry has made some discoveries of importance and enthusiastically expects wonders will be performed by the use of certain gases which inebriate in the most delightful manner, having the oblivious effect of Lethe and at the same time giving the rapturous sensation of the Nectar of the Gods! Pleasure even to madness is the consequence of this draught. But faith ; great faith is I believe necessary to produce any effect upon the drinkers and I have seen some of the adventurous philosophers who sought in vain for satisfaction in the bag of *gaseous oxyd* and found nothing but a sick stomach and a giddy head."

Efforts and their Results

THE Chief Medical Officer of the Ministry of Health, Sir John Charles, in an address to the Executive Councils Association (England), did much to put the work of the dental profession in the Health Service in proper perspective, and thus in some measure to counteract the effects of the unwelcome publicity which has been accorded to the misdeeds of a tiny minority of the profession. The figures he gave showed that the rate of demand for dental treatment was still rising, there now being 190,000 applications for treatment per week as against a corresponding figure of 180,000 a year ago. This fact alone shows that, as Sir John said, " the dental profession is tackling an enormous volume of work with tremendous energy." It is certain that the provision of dental treatment on this scale will ultimately " be reflected in an improved level of national general health" but it is equally beyond question that even greater improvements could have been secured if some part of the energy which has gone to achieve this result had been directed to providing complete treatment for the priority classes.

Fifty Years Ago

From the "Journal of the British Dental Association," October 15, 1900.

IN the course of another half-century their President might possibly be in a position to state that the naval and military authorities had at length recognised the necessity for the examination of the teeth of recruits being conducted by an expert, and that they had found it desirable, and truly economical, to appoint dental surgeons to examine the teeth of recruits and further to maintain the efficiency of the teeth of all men in Her Majesty's services.

From the Presidential Address to the Odontological Society by Mr. John Ackery, October 22, 1900.

LETTERS TO THE EDITOR

OCCLUSION AND ARTICULATION

SIR,—The late Sir Norman G. Bennett defined occlusion as " the relationship of the teeth of the maxilla and mandible when the jaws are closed and the condyles are at rest in the glenoid fossæ." It is perhaps thirty years since this definition was published so it may be that Sir Norman did not take into consideration the freeway space. Personally, I have always taken his definition to refer to the upper and lower teeth being in their closest contact, taking his words " when the jaws are closed " to mean this.

From this one gathers there is only one position of the mandible in relation to the maxilla to which the term occlusion can apply. In that case there is no need for qualification, e.g., " centric occlusion " which presumably has the same meaning as " occlusion ; " one has also seen "centric articulation" and would like to know what meaning these terms are intended to convey.

The same writer defined articulation as : " the contact relationships of the teeth of the maxilla and mandible which occur during the movements of mastication," so there may be reason for qualification in this regard. If there is, it is desirable these qualifications be defined and kept as few as possible.

It seems desirable to select a word to describe the relation of the mandible to the maxilla without contact of upper and lower teeth, though they are present and capable of contact, the position of the mandible being the normal rest position, including the freeway space. If this were done the work of authors and readers would be simplified.

6, *Upper Wimpole Street*, *W.*1. Yours faithfully,
HAROLD CHAPMAN.

RESULTS OF REMOVAL OF FIRST PERMANENT MOLARS

SIR,—The criticisms of my paper on the removal of the our six-year molars made by Mr. P. Adler (*Brit. dent. J.*, Sept. 5, 1950), are so similar to those made by other correspondents, that I will be grateful if you will allow me to publish this reply.

It would have been of advantage to have compiled and published both the A.C.F. and M.D.F. of the two groups at the beginning and at the end of the investigation period, but where the experimental group chose itself as those children who required the extraction of two or more first permanent molars, by what process of selection could an identical number of children be chosen to form the control group from some 1,800 school population of the same age in that area ? Because of this obvious difficulty my investigation was designed to give a comparative picture of the state of dental health of the two groups at age 16 years. The school population had by then dwindled to some 187 children, 77 of whom were of the experimental group.

I was very fortunate that so many of this group were still attending school when the final evaluation was made. Only those children whose clinic record cards showed that they had been examined and treated semi-annually were admitted to the control group.

The susceptibility of the first permanent molar to decay is related to the susceptibility of the deciduous dentition, and not to that of any permanent tooth which erupts anterior to it in the arches. It is surprisingly common to find badly decayed first permanent molars in otherwise caries free dentitions, but sometimes the second molar will show the same susceptibility as the first.

I have not read the Schmid report, but I think that the answer to the difference in obtained results is probably to be found in the age groups concerned. It is not common to find caries of anterior teeth in children in their eleventh year, which would be one year after the extractions were done in my investigation. In fact children in their tenth year were specifically chosen for the experiment because, excluding deciduous teeth and the first permanent molar, the incidence of decay in such permanent teeth as may by then have erupted is extremely small, and, had it been possible to take an A.C.F. at the start of the investigations, only these teeth would have been included, because the condition of a mixed dentition cannot sensibly be compared with that of the future permanent dentition.

36, *Kings Avenue*, *Bromley, Kent.* Yours faithfully,
J. HUTCHISON GLEN.

FILLING OF DECIDUOUS TEETH IN SCHOOL SERVICE

SIR,—In the issue of August 18 (p. 113) you review the dental services of a certain City Education Committee and describe them as " undoubtedly well organised."

You quote the number of fillings inserted in permanent teeth ; the number of extractions of permanent teeth ; the number of extractions of temporary teeth, and some other statistics.

No mention is made in your review of the number of fillings inserted in temporary teeth.

Can it be that the filling of temporary teeth is not regarded as being worthy of mention, or is there some other explanation ?

14, *Belgrave Road*, *Corstorphine*. Yours faithfully, THOS. H. J. DOUGLAS.

According to the report to which Mr. Douglas refers, 19 fillings were inserted in temporary teeth during the year under review. The smallness of this figure suggests that the efforts of the depleted staff were concentrated on conserving permanent teeth and removing sepsis. Even with this restriction some 38 per cent of the school population were not even inspected during the year.—ED., *B.D.J.*

THE POLYMERISATION OF ACRYLIC DENTURE BASE MATERIALS

SIR,—The article by Professor Matthews and Mr. W. R. Tyldesley (*Brit. dent. J.* (1950), **89**, 148) immediately raises the question of what such tests as have been carried out mean in terms of practice.

Any polymerisation method can be considered satisfactory from a practical point of view if the finished dentures—

(1) produce no biological reaction ;
(2) are no less resistant to wear than those produced by other methods ;
(3) are no more prone to fractures.

In addition, it should be such that it will minimise the processing risks that may result in porosity of the denture bases and bleaching of the teeth.

It is interesting to see how the results obtained from a long, low temperature cure compare with these criteria.

Over a long period, the laboratory at this hospital has dealt with some thousands of dentures by processing overnight at 70° C., with no final boil. No biological reaction has been observed, no appreciable wear has occurred and there have been remarkably few fractures, with an almost complete absence of the mid-line fractures of uppers that seem to have caused so much embarrassment to some practitioners. Porosity has only been seen in rare cases, and in all of these there have been grounds for belief that the fault has been under-packing. No bleaching of teeth has been observed.

It is true that these happy results may not be due entirely to the processing technique. Freedom from mid-line fractures, for example, may be entirely unconnected with the processing method and may be due to one or more of several other factors.

Nevertheless, the curing method *may* be of importance and it is pardonable to ask if it is justifiable to change it, even if it is now shown to produce a resin of disgracefully low molecular weight and tensile strength. Are high molecular weight and tensile strength the properties that most concern us ?

Resistance of denture bases to flexural fatigue would seem to be one of the most important properties as far as resistance to fracture is concerned. Professor Matthews, in collaboration with Wesley Johnson (*Brit. dent. J.* (1950), **86**, 252) has shown that different denture base materials may have very different fatigue strengths, even if their tensile strengths are similar. This means that the tensile strength of a material is, in itself, no guide to its fatigue resistance and we have no grounds for assuming that an increase in tensile strength will imply an improvement in fatigue resistance. It is even possible that the converse may be true and that an increase in tensile strength may result in a material showing less resistance to fatigue.

While not wishing for one moment to detract from the value of the work done by Professor Matthews and Mr. Tyldesley I feel that those of us who are using a trouble-free curing method should not be tempted to change it solely on the evidence so far produced, even if it does show up badly on the basis of these results. They cover only one facet of a subject that must be more fully investigated before final conclusions can be reached.

Lower Maudlin Street, *Bristol* 1. Yours faithfully, A. O. CHICK.

XYLOCAINE

SIR,—Various local anæsthetic solutions containing Xylocaine are now appearing on the market, and the question of terminology has been raised by one of your correspondents.

It may not be generally appreciated that published articles to date refer to clinical and experimental work with the solution made to the formula of Messrs. Astra (Sweden). This solution is now being made under licence by Messrs. Duncan Flockhart (Edinburgh).

The clinical effects of solutions other than the above have not, to my knowledge, been reported on, and although Xylocaine may be contained in such solutions, other agents, which may modify its effects, are also present.

I should add that I have no proprietary interest in the manufacture of Xylocaine.

St. Margaret's Hospital, *Highworth Road*, *Stratton St. Margaret*, *Swindon*. Yours faithfully, R. THEXTON.

NOMENCLATURE OF DRUGS

SIR,—It would appear that in my previous letter on w-diethylamino-2·6-dimethylacetanilide, I did not sufficiently stress one point, i.e. that the local anæsthetic drug used in " Xylotox " and " Xylocaine " is identical. Had J. S. Smith given the quantity of water in the " Xylocaine " formula it would have shown how closely the two preparations resembled or differed from one another. I should be grateful if he would give us the formula of each in gm. per c.c. for the sake of clarity.

It is for the individual practitioner to decide whether he wishes to use manufacturer A's or manufacturer B's formula and preparation of the drug, but let each manufacturer declare his formula on the bottle or package and to a standard such as gm. per c.c. There must be nothing suggestive of the secret remedy about any preparation offered to the profession.

50, *Wimpole Street*, *W.*1. Yours faithfully, GEORGE A. COWAN.

NOMENCLATURE OF DRUGS

SIR,—I have read with interest the letter from J. S. Smith in which he compares the pH of Xylocaine and Xylotox.

Whilst agreeing that the formula of Xylocaine without adrenaline would be close to the neutral pH 7, I must point out that any local anæsthetic solution containing adrenaline must be around pH 4 to ensure stability. To this rule Xylocaine (Duncan) is no exception, as will be seen from the literature supplied with the drug.

Thus, unless your correspondent is prepared to use the Xylocaine (Plain) without adrenaline, which gives only a transient anæsthesia, he will find that the pH values for Xylocaine and Xylotox will each be approximately pH 4.

Renfrew Cots,
Holyhead Road,
Albrighton,
Salop.

Yours faithfully,
A. J. CLEGG.

G.B.S. AND DENTISTRY

SIR,—The passing of George Bernard Shaw will doubtless revive memories, not altogether complementary, of his lively attitude to the medical profession.

It is not without point, therefore, that this typical sentence of his should be recalled :

" There is nothing that soothes me more after a long and maddening course of pianoforte recitals than to sit and have my teeth drilled by a finely skilled hand."

Burway Chambers,
Church Stretton,
Shropshire.

Yours faithfully,
J. KNIGHT.

Reviews and Abstracts

A TEXTBOOK OF DENTAL ANATOMY AND PHYSIOLOGY. Second Edition. By Russell C. Wheeler, D.D.S., F.A.C.D., Associate Professor of Anatomy, Washington University, School of Dentistry, Saint Louis. W. B. Saunders Company, Philadelphia and London. Price 35s. 442 pages, 415 illustrations.

The first edition of this book was published in 1940. The text has been improved and slightly expanded but no major alterations have been found necessary. The purpose of the book is to describe the gross anatomy of the human masticatory apparatus, the forms of the teeth, their relation to one another and to the jaws, the anatomy of the bony jaws and the temporomandibular articulation. No attempt is made to deal with histology and there are brief references only to the anatomy of soft parts.

It is a textbook which has no British equivalent and in any case deserves to attain a considerable popularity in this country. It is an example of the very best type of American textbook. The illustrations are excellent and profuse without being superabundant and the author writes with great clarity and without over-elaboration. This is best exemplified in chapters XV and XVI, the first on the temporomandibular articulation and the other on occlusion. These two subjects, which are difficult to deal with, especially in terms of function, are treated in a lucid and remarkably restrained and balanced manner. Of these two chapters it would be impossible to speak too highly and every orthodontist would profit by reading them. The book as a whole, however, should have a much wider appeal. Not only the orthodontist is interested in the anatomy of the teeth and their occlusion ; in fact no dentist whatever branch he practises will fail to find a great deal of interest and profit in these pages.

Although the amount of detail is more than that required by those studying for qualifying examinations, undergraduates would find it helpful to read it. By doing so they will realise how much of interest and value lies in a study of the details of the masticatory apparatus.

The relationship of the anatomy of structures to function is emphasised throughout, which is ample justification for the inclusion of physiology in the title. The author is an enthusiastic protagonist of tooth carving as a means of teaching tooth form and its significance and a few of the illustrations are of beautifully carved replicas. The actual technique of carving is the subject of a separate publication by the same author (Tooth Form, Drawing and Carving, a Manual. W. B. Saunders Co., 1939).

The reviewer was pleasantly surprised to find that this well-bound book of more than 400 pages of good quality paper is so moderately priced.

New Zealand Dental Public Health Services.—A. O. Gruebbel who visited New Zealand and gave a detailed report of his findings agrees with those who have demanded proofs of the efficacy of the much vaunted scheme for dental treatment of school children by dental nurses. Gruebbel found, as a result of his examinations of children and young people that there was a high incidence of caries, higher than in any other country. The indictment is grave and reveals that after all the training of the auxiliary is purely mechanical and surgical. Gruebbel holds that the position as regards dental practitioners in New Zealand is untenable since they consider the dental nurse is fully qualified to treat children but not adolescents adding " no amount of rationalisation can overcome the sound argument that children are entitled to receive the same high quality of care and the same completeness of service as are adolescents."—GRUEBBEL, A. O. (1950) *J. Amer. dent. Ass.*, **41**, 275.

The Influence of Some Surface-Active Substances on Decalcification of the Enamel Surface.—Sound human teeth which had been kept in formalin were rinsed in acetone and dried in the air. One-half of the crown was then coated with wax and to the other half the substance to be tested was applied with a brush. The tooth was then immersed in normal mixed saliva of pH 5·0 at 37° C. for twenty hours during which the solution was frequently shaken. At the end of this period the calcium content of the saliva was measured and compared with that of a control sample. The wax was removed and fresh wax was applied to the other half of the crown. The tooth was then immersed in mixed saliva as before and the calcium content measured. The difference between the amount of calcium dissolved from the protected and unprotected sides of the tooth formed the basis for the assessment of the efficacy of a number of oily or surface-active substances in protecting the enamel against decalcification. Fats such as butter and lard and greasy substances such as petroleum jelly afforded slight protection but their liquid counterparts, such as olive oil and paraffin oil, were ineffective. The action of these agents

is probably simply mechanical and inquiry was therefore extended to less common compounds which might form an adsorbed film. Better results were obtained with oleic acid and with a solution of cetylamine, a waxlike long chain aliphatic amine, in paraffin oil. A single application of cetylamine in paraffin afforded 50 per cent protection over a period of 24 hours. Comparison of the efficacy of cetylamine with that of similar agents of different chemical constitution suggests that its greater effect is due to its possession of $-NH_2$ groups which are adsorbed by the enamel surface while its hydrocarbon radicals act as a bridge between the enamel and the paraffin oil, which is enabled to form a more or less stable film.—J. P. WALSH and R. W. GREEN (1950) *J. dent. Res.*, **29**, 270.

Dental Injuries following Radical Surgery on the Maxillary Sinus, with Special Reference to Changes in Sensitivity after Caldwell-Luc Operations.—This investigation was based on a series of 247 patients operated on for maxillary sinus affections by Caldwell-Luc technique, Denker technique and endonasal trephination. The state of the maxillary teeth was investigated both by preoperative and postoperative examinations and also several years after operation. The investigations were by electrical threshold determinations by Bjorn's technique and by X-ray. The sensitivity of the gingivæ was tested with a needle, the approximate duration of the subjective symptom being recorded: The sensory disturbances in the maxillary teeth were classified as (*a*) total anæsthesia, usually of short duration, and followed by (*b*) relative anæsthesia, consisting of a rapid regression phase and a retarded regression phase during which the sensitivity of the teeth gradually returned, (*c*) the occasional occurrence of permanent anæsthesia. It is demonstrated conclusively that the operative phase mainly responsible for the sensory dental disturbances is the resection of the anterior wall of the sinus. This was confirmed by the use of a modified operative technique by which the incision in the vestibular mucosa was made as high as possible where the nerve fibres are least dense. The results of this technique were that sensory disturbances were much less pronounced.—MARTENSSON, G. (1950) *Acta oto-laryng., Stockh.* Supp. 84.

THE HEALTH SERVICE

SUPERANNUATION

Allocation of Pension

ONE of the provisions of the Superannuation Scheme is that an officer or a practitioner who is retiring on pension or entitled to an injury allowance may, if he wishes, surrender part of the pension or injury allowance in order to secure a pension for his wife, or any dependent, who survives him.

The decision to allocate part of a pension cannot be taken until the time when the dentist retires, or reaches pensionable age, whichever is the earlier. The "pensionable age" for practitioners is 65, but can be extended with the consent of the Minister up to 70.

Not more than one-third of a dentist's pension can be allocated in this way.

As an example of the way in which the scheme works a practitioner retiring at 65, with a wife aged 61 would secure for her in the event of his death a pension of £2 for every £1 of his pension which he surrendered. Thus if his pension was £900 per annum he could by surrendering or "allocating" £300 of it, ensure that his wife would receive a pension of £600 per annum after his death. This would be in addition to any widow's pension to which she would be entitled under the Regulations.

The Scheme applies equally to women officers and practitioners.

Members who are interested can obtain a booklet entitled "Allocation of Pension" (Reference A.L.) from the Stationery Office or through a bookseller at the cost of 6d. This booklet gives fuller details of the scheme and tables showing the rates applicable according to the ages of the pensioner and the beneficiary.

DENTISTRY IN THE HEALTH SERVICE

The Chief Medical Officer's Comments

SPEAKING at the annual meeting of the Executives Councils Association (England) at Harrogate on October 26, Sir John Charles, Chief Medical Officer of the Ministry of Health said "The dental profession is tackling an enormous volume of work with tremendous energy." There is already a higher level of dental health and dental comfort, and a little later this will be reflected in an improved level of national general health."

Sir John went on to say that 14,500,000 patients had been treated since the beginning of the service. The rate of demand was increasing and was bound to increase further as appreciation of dental care grew. There were now 190,000 applications for treatment a week compared with 180,000 last year. There were far too few dentists in all branches of the profession. Not only were all the dental schools crowded to capacity but experiments were being tried in the training of oral hygienists.

CONFERENCE OF LOCAL MEDICAL COMMITTEES

Remuneration of Doctors

THE Annual Conference of Representatives of Local Medical Committees was held at B.M.A. House, London, on October 26. Dr. S. Wand, Chairman of the General Medical Services Committee, told the Conference that, for reasons outside the control of the committee or the Ministry of Health, it would be impossible to complete the inquiry into practice expenses and doctors' incomes before the end of the year. He accordingly moved that the Special Conference which was to be called in December be postponed until March 1951. This was agreed. The Conference also agreed that resignations from the Service should not be collected until after the publication of the decision of the Minister on the surveys which were being made, unless such publication was unreasonably delayed. Later the Conference adopted a resolution expressing the opinion that no mass withdrawal from the Service could be effective without the withholding of medical certificates.

THE Minister of Health has approved the following brands of acrylic resins for use under the General Dental Services Fees Regulations: Kallodent 222, Portex, Thermolite, Stellon, Lumacryl, Kallodent 333, Plastacryl, Supearl, Clinex, Durrocryl.

It is expected that, from time to time, additional brands of plastic denture base materials will be approved for use in the Health Service.

Dental News

PRESENTATIONS TO MR. AND MRS. W. S. CROWTHERS

A DELIGHTFUL Dinner function took place at the Royal Station Hotel, Newcastle-on-Tyne on Wednesday, October 11, when members of the past Incorporated Dental Society, now members of the British Dental Association, assembled to honour Mr. W. S. Crowthers, Past President of the Incorporated Dental Society, one time Editor of the *Mouth Mirror* and a much respected and loved Life Member of the British Dental Association.

On behalf of the contributors, Mr. Arthur H. Condry, Executive Officer of the British Dental Association and, prior to Amalgamation, General Secretary of the Incorporated Dental Society, presented Mr. Crowthers with a gold cigarette case and Mrs. Crowthers with a gold compact. Mr. Condry recalled some of the many services Mr. Crowthers had performed for the dental profession and in particular recounted incidents in his career in the Incorporated Dental Society and as editor of the *Mouth Mirror*. He made special reference to the delightful manner in which Mr. Crowthers had made the presentation to the Association at Birmingham University, on the occasion of the Annual Meeting, of the framed Presidential Badge of the Incorporated Dental Society and recalled that Mr. Crowthers was the donor of the badge in 1925 to the I.D.S. Concluding, he spoke of the regard in which Mr. Crowthers was held by his many colleagues throughout the dental profession. It was, he said, given to but few to earn such regard and affection as that which they felt for the two dear old friends whom they had met to honour. The presentations were made in a scene of great and affectionate enthusiasm.

Mr. Crowthers, speaking with obvious emotion, on behalf of Mrs. Crowthers and himself, thanked the donors of the gifts they had received. He referred to many of his old colleagues, stalwarts in the activities in which he had been engaged all his life, and it was apparent to all who listened to him that the tributes which had been paid to him and to his wife were more than well deserved.

Among those present at the Dinner were Miss Shenton, chief clerk to the Incorporated Dental Society at the Tavistock Square offices for many years until her retirement in 1939, Mrs. Atkinson, widow of the late Mr. T. Atkinson, a well-known figure for many years in the Incorporated Dental Society, Professor R. V. Bradlaw, Mr. and Mrs. H. Davis and Mr. J. Long.

ROYAL COLLEGE OF SURGEONS OF ENGLAND

AT a meeting of the Council of the College held on October 12, Mr. W. Kelsey Fry was co-opted to the Council to represent Dental Surgery in the place of Professor R. V. Bradlaw who had resigned. Mr. E. C. B. Butler was admitted to the Board of Examiners in Dental Surgery (Surgical Section).

MEDICAL RESEARCH COUNCIL

LONDON University have conferred the degree of Doctor of Science on Mr. J. D. King, Director of the Dental Research Unit of the Medical Research Council on the basis of his published work.

MONOPOLIES COMMISSION—DENTAL GOODS

IN a written reply given on November 7, 1950, the President of the Board of Trade said that he had received the first Report of the Monopolies Commission, which was on dental goods, and that the Report would be laid before Parliament as soon as it was printed.

NATIONAL JOINT COUNCIL FOR THE CRAFT OF DENTAL TECHNICIANS

Fair Wages Clause

AT a recent meeting of the Joint Council the employers' representatives urged that cases where dentists were alleged by the Unions to be in breach of the Fair Wages Clause (paragraph 11A of the Terms of Service) should not be referred directly to Local Executive Councils. The employers pointed out that Dental Service Committees were not bodies experienced in labour disputes, and that the constitution of the National Joint Council, to which the Unions had subscribed, provided for the Joint Council to act as a conciliating body in any dispute between dentist and technician.

The Unions' side accordingly agreed that they will carry out the following procedure in every case where it is alleged that a dentist on the list of an Executive Council is paying rates of wages or observing hours or conditions of work less favourable than those approved by the Joint Council.

The case will be reported to the Joint Secretaries who will approach the parties in order to see whether a settlement can be effected forthwith. If settlement in this way cannot be achieved the case will go to the Disputes Committee of the Joint Council, which will hold an early hearing. This hearing will take place if possible in the neighbourhood where the dispute has arisen and both the dentist and the technician concerned will be invited to attend.

It is hoped that in this way it will be possible to settle cases of this kind without reference to the Local Executive Council. Members are advised to report forthwith to Headquarters any such cases in which they may become involved.

Ministry of Labour Training Scheme

The Ministry of Labour are endeavouring to secure the co-operation of dentists in some parts of the country in taking ex-Servicemen for training under a Vocational Training Scheme.

The Scheme provides for eighteen months' training on wages paid by the Ministry of Labour and a further period at the expense of the employer. The National Joint Council refused their help to this scheme as they are satisfied that it is not adequate to produce properly competent technicians.

DENTAL CONSULTANT TO W.H.O.

DR. PHILIP E. BLACKERBY, Jr., dental director of the W. K. Kellogg Foundation of Battle Creek, Mich., has been appointed consultant in dental health to the World Health Organisation for the period October 1 to December 31, 1950. Dr. Blackerby is to study dental health activities in Great Britain and Europe and to make recommendations to W.H.O.

BRITISH SOCIETY OF PERIODONTOLOGY

AT a Meeting of the British Society of Periodontology to be held at the London Hospital Medical College on Monday, December 11, 1950, at 5.15 p.m., Mr. Colin Davis, L.D.S.Eng., will present a paper on "The Tooth-Brush"; it is felt that this subject is of vital interest to the profession and a number of tooth-brush manufacturers have accepted invitations to attend. It is expected that the discussions will be of great interest, and the Society will be glad to welcome guests on this occasion.

SCOTTISH SOCIETY OF THE HISTORY OF MEDICINE

AT the recent annual meeting of the Scottish Society of the History of Medicine Mr. J. Menzies Campbell was elected a member of the Council. Mr. Menzies Campbell is well known for his interest in, and researches into, dental history.

LECTURE ON PARTIAL DENTURES

A LECTURE will be given by Professor J. Osborne on "Partial Dentures" under the auspices of the Institute of British Surgical Technicians (Dental Section) on Tuesday, November 28, 1950, at 6.30 p.m., at St. Ermin's Hotel, Caxton Street, London, S.W.1.

Admission tickets are obtainable on sending stamped addressed envelope to the Institute of British Surgical Technicians, 6, Holborn Viaduct, London, E.C.1.

CHRISTMAS CARDS

THE Grenfell Association has once again produced an attractive series of Christmas cards at prices ranging from 6d. to 1s. The profits from the sale of these is devoted to the maintenance of the medical and dental work of the Mission in Labrador and Northern Newfoundland. Devaluation has affected the fish and lumber industries adversely and the calls on the Mission are likely to be heavy this winter. An illustrated leaflet of the cards can be obtained on application to Miss Betty Seabrook, Grenfell Association of Great Britain and Ireland, 66, Victoria Street, London, S.W.1, enclosing a 1d. stamp.

The Schools

The Royal Dental Hospital of London.—Speaking at the Prize-giving of the Royal Dental Hospital, on October 6, Sir Cecil Wakeley, President of the Royal College of Surgeons of England, said that a comprehensive dental service having been introduced it seemed unlikely that any government would jettison it. The dental profession might well feel that the Government having got itself into the mess should get itself out, but the profession had a responsibility to the community to offer from its experience advice as to how to make the best of the service. Speaking of the shortage of dentists, he said, it was clear that if the dental health services were to have firm foundations, there must be more dental surgeons with a sound basic scientific training, who were not only technically skilled, but who understood the relationship between oral and systemic disease. He particularly regretted the disintegration of the school dental service. It seemed to him that unless they could secure that children left school in sound dental health, which was maintained throughout life, dental treatment under the Health Service was likely to remain largely a breakdown service for dental cripples.

Mr. H. L. Hardwick, Dean of the School, in his review of the past year's work, said that although the site for a new St. George's Hospital and School had been obtained no further progess had been made and the scheme was suspended for the present. This was serious as it affected the accommodation for some 500 medical and dental students. Reviewing the changes which had taken place in the teaching staff he welcomed Dr. R. B. Lucas who had been appointed University Reader in Pathology. The University, he said, had appointed precisely the type of individual they desired—a pathologist of eminence and wide experience who had a special interest in the pathology of the oral tissues. He hoped they would shortly be able to fill the newly created post of Reader in Orthodontics, which would he believed be the first appointment of its kind in the country. Their student body continued to maintain its high academic record during the year—some 70 per cent of their full time students taking their final examinations being successful.

University of Leeds.—The Annual Dental Ball will be held on Friday, December 1, 1950.

Tickets, 12s. 6d. double, may be obtained from the Social Secretary, Dental School, Blundell Street, Leeds, 1.

The Services

Medical Officers in the Services – Pay.—On October 18, 1950, a debate took place in the House of Lords on medical man-power, with particular reference to the armed forces and the Colonial Service.

The question of medical officers' pay in the Services was raised; and in replying to the debate on behalf of the Government Lord Shepherd said: There had been changes in the country's condition, and it was now realised that there must be a restrained movement both of wages and of salaries. The cost of living had advanced with the result that amongst the claims which might be made would be this particular claim. This could be well made, not merely because the cost of living had gone up but because it was right that medical men in the Forces ought not to be worse off than medical men in civil life; moreover, medical men in the Services ought not to be worse off than men employed on general military occupations in the Forces. Undertakings had been given that the utmost consideration would be given to the claim and he was informed by the Ministries that not only was this subject under active consideration but it had been pressed by the Ministries upon the Treasury. He was informed that the hope was not too large to entertain that this would be the last time that their Lordships would be bothered about the particular claim made from time to time in respect of the medical services in the Forces. He hoped that noble Lords would accept what he had said in that respect as being not merely what he believed would happen but what would happen. The circumstances were urgent and he was sure it would be to the interests of the country as a whole, and to the Government in particular, that this thorny problem should be settled satisfactorily once and for all.

Two Fifty Club Dinner.—The Fifth Annual Dinner of the Two Fifty Club (Non-regular Ex-officers Royal Army Dental Corps) will be held at the Victory Club, Seymour Street, Marble Arch, W.2, on Saturday, January 27, 1951, at 6.30 p.m. Tickets, £1 1s. (excluding wines), may be obtained from the Secretary, Major J. W. Cooper, 726, Fulham Road, London, S.W.6. Early application is desirable as tickets are limited.

Obituary

OSBERT MORDAUNT, L.D.S.Eng.

OSBERT MORDAUNT died at his home in Scarborough on October 5. He qualified from the Royal Dental Hospital in 1896. He practised at Retford until 1948 in a practice started by his father in 1865. He retired to live in Scarborough. Gifted in his work, he took a tremendous pride in his profession, and gave of his best to his patients. His knowledge was extensive and dentistry was his hobby. Those who had the great pleasure of working for him found him a unique personality, a brilliant dentist from whom they could learn much. By his passing the profession has lost one of the best. He leaves a widow and two sons.

Hubert Woodley Betts of New Square, Cambridge, died at Westcliff-on-Sea on October 2. Born at Cambridge in 1883 he practised there for over 40 years. A keen Freemason he was a Past Master of Lodge 441 and had been president of the Cambridge Masonic Club. He leaves a widow, two daughters and two sons, one of the latter—Mr. V. P. Betts, L.D.S.Eng.—being in practice in Cambridge.

Leonard Adolphus Charles Knight, L.D.S.Eng., of Gosport, died at the end of September. A Guy's man, he qualified in 1900 and was elected to the B.D.A. in 1905. He practised at Gosport for over 40 years and was Hon. Dental Surgeon to the Gosport War Memorial Hospital.

Arthur Edmund Lowein, L.D.S.Eng., of Cowes, Isle of Wight, died at sea while on a voyage to Australia and New Zealand. He qualified in 1914 from Guy's and had practised in Cowes since 1916. He joined the B.D.A. in 1930 and was the first chairman of the I. of W. Section of the Southern Counties Branch. A keen yachtsman he was president of the East Cowes Sailing Club and a member of the Royal London Yacht Club. During the war he was divisional superintendent of St. John Ambulance Brigade. He leaves a widow, two sons and two daughters. His elder son, Mr. R. T. Lowein, has been carrying on his father's practice at Cowes.

Eric Carson Nichols, L.D.S.Eng., of Reading, died in his surgery on October 3. He qualified in 1919 and joined the B.D.A. in 1923.

Herbert Leslie Whitlow, L.D.S.Eng., late of Southport, died on July 18 at Crowthorne, Bucks, aged 72. He qualified from Guy's in 1901, and joined the B.D.A. in 1905. He leaves a son and daughter.

The Charge for Announcements of Births, Marriages and Deaths is 2s. 6d. per Line. (Approximately 8 words.) Minimum 7s. 6d.

Births

BERY.—On October 3, at 26, Eaton Rise, Ealing, W.5., to Doris (*née* Davison), wife of B. Theodore Bery, L.D.S. R.C.S., a daughter, Linda Kay, sister to Odette and Clive.

COOPER.—On October 2, 1950, at Queen Charlotte's Maternity Hospital, London, to Frieda (*née* Bell), wife of J. Richard Cooper, L.R.C.P., M.R.C.S., L.D.S., a daughter.

DOWN.—On October 15, at Queen Charlotte's Hospital, to Nora, wife of George R. Down, L.D.S. R.C.S.Eng., a daughter (Angela Mary)—sister for Charles.

FAIRFAX.—On August 26, 1950, to Hildegard, wife of Donald Fairfax, 17, St. Nicholas Avenue, Elm Park, Romford, Essex, a daughter.

GREENHALGH.—On September 25, at Wyndale Nursing Home, Bramhall, to Audrey, wife of Vernon H. Greenhalgh, L.D.S., of The Mount, Bramhall Park, Cheadle Hulme—a son, brother for Paul.

MORTALI.—On October 15, 1950, to Jean (*née* Cooper), wife of F. G. A. Mortali, B.D.S., L.D.S., 3, Bellefield Avenue, Dundee, a daughter, Sheila Irene.

POWELL-CULLINGFORD.—On September 20, 1950, at Fair Oak, Esher, to Peggy (*née* Brown), wife of H. L. Powell-Cullingford, L.D.S., of Fair Oak, Esher—a sister for Mary (Gillian Eileen).

STONEHOUSE.—On October 8, 1950, at Friars Craig Nursing Home, Coventry, to Joan, wife of E. F. Stonehouse, L.D.S. R.C.S.Edin., a son.

TAYLOR.—On October 2, at Hove, to Elizabeth (*née* Dobinson), wife of S. Beresford Taylor, L.D.S., 2, New Church Road, Hove, a son.

Marriage

SCHULER—SAMUELS.—On October 1, Leonard H. Schuler, L.D.S., of 5, Strathearn Place, Hyde Park Square, London, W.2, to Susan M. Samuels, younger daughter of Maie Samuels and the late Isidore Samuels, L.D.S., of Exeter.

Deaths

ANDREWS.—On August 22, in a Nursing Home, Herbert Andrews, of 118, High Street, Uckfield, Sussex.

FRASER.—At a Nursing Home in Edinburgh, on September 29, 1950, Robert Murray Fraser, L.R.C.P.&S., H.D.D., L.D.S.Edin., of 10, Charlotte Square, Edinburgh, who resided at 28, Morningside Place, Edinburgh.

Our Diary

Thursday, November 23.

Central Counties Branch.—Medical School, Edgbaston, Birmingham 15, 7.30 p.m. "General Dental Service Committee," Lionel E. Balding.

Friday, November 24.

West Kent Section.—Wrotham Park Club. Dinner, 7.30 p.m. "Impression Technique: Kostecka's Operation" (Lantern Slides), Professor H. R. B. Fenn

Saturday, November 25.

The Continental Dental Society.—Eastman Dental Clinic, Gray's Inn Road, London, W.C.1. 10 a.m., Papers; 2 p.m., Papers; 4 p.m., Table Demonstrations.

The Royal Dental Hospital of London School of Dental Surgery.—Annual Clinical "At Home," Royal Dental Hospital, 3 p.m. Annual Dinner, Savoy Hotel, 7 for 7.30 p.m.

Monday, November 27.

Metropolitan Branch—Southern Section.—Annual Meeting, Bedford Hotel, Bedford Hill, Balham, S.W.12, 7.45 p.m. "Full Denture Prosthesis," Alan Mack. All practitioners specially welcome.

The Royal Society of Medicine—Section of Odontology.—1, Wimpole Street, London, W.1, 5.30 p.m. "Enamel Lamellæ in Relation to Dental Caries," Professor E. B. Manley and J. L. Hardwick.

Tuesday, November 28.

The Institute of British Surgical Technicians—Dental Section.—Lecture, St. Ermin's, Caxton Street, London, S.W.1, 6.30 p.m. "Partial Dentures," Professor J. Osborne.

Preston, Leyland and Chorley Section.—Starkie House, Starkie Street, Preston, 7.30 p.m. "Hints for Inlays, Crowns and Bridges," E. Neubert.

Wednesday, November 29.

East of Scotland Branch.—British Medical Association House, 7, Drumsheugh Gardens, Edinburgh, 7.30 p.m. "Clinical Dental Psychology," Professor J. Aitchison.

Monday, December 4.

East Lancashire and East Cheshire Branch.—Midland Hotel, Manchester, 7.30 p.m. "The New Zealand Dental Nurses' Scheme," Professor R. V. Bradlaw.

Metropolitan Branch—South Eastern Section.—War Memorial Hospital, Shooters Hill, S.E.18, 8 p.m., preceded by coffee, 7.30 p.m. "Recent Research in Dentistry," Dr. C. W. T. Shuttleworth.

Wednesday, December 6.

East Lancashire and East Cheshire Branch.—Annual Dinner and Dance, Midland Hotel, Manchester, 7.30 p.m.

Wessex Branch.—Annual Dinner, Royal Bath Hotel, Bournemouth, 7.15 for 8 p.m.

West of Scotland Branch.—"Facts and Fallacies in Present Day Dentistry," Dr. A. B. MacGregor.

Metropolitan Branch—Finchley Sub-Section.—319, Ballards Lane, N.12, 8 p.m. "Filling Materials," Warren Harvey.

Thursday, December 7.

Metropolitan Branch.—13, Hill Street, Berkeley Square, W.1. 7.15 p.m., Annual General Meeting of Members; 8 p.m., Annual General Meeting open to subscribing Members, Ladies and Visitors.

Northern Counties Branch.—Annual Meeting, Sutherland Dental School, Northumberland Road, Newcastle-on-Tyne. 4.30 p.m., Council Meeting; 5.30, Branch Meeting; 7.30, Informal Dinner.

Yorkshire Branch.—Joint meeting with Leeds and District Section, Leeds School of Dentistry, 7.30 p.m. "Dental Estimates Board," T. Leaver.

The Birmingham Medical Institute—Section of Odontology.—154, Great Charles Street, Birmingham, 3. "Oral Pathology in Children," Professor John Boyes.

Bristol and District Section.—Dental Hospital, Bristol. Brains Trust, 7.30 p.m.

Thursday and Friday, December 7 and 8.

Leeds and District Section.—Thursday: 7.30 p.m., Joint Meeting with Yorkshire Branch, Leeds School of Dentistry. "Dental Estimates Board," T. Leaver. Friday: 7 p.m., Annual Dinner and Dance, Grand Hotel, Harrogate.

Friday, December 8.

Bognor Regis, Chichester and District Section.—Dinner, Sefton Lodge Hotel, Bognor Regis. "Interpretation of Dental Radiographs," F. Manfield.

Saturday, December 9.

Central Counties Branch.—Annual Dance, Grand Hotel, Birmingham.

East of Scotland Branch.—Annual Dinner-Dance, Music Hall, George Street, Edinburgh, 6.45 for 7 p.m.

Monday, December 11.

The British Society of Periodontology.—London Hospital Medical College, Turner Street, E.1, 5.15 p.m. "The Toothbrush," Colin Davis.

The British Society for the Study of Orthodontics.—Annual Meeting, Manson House, 26, Portland Place, London, W.1, 7.30 p.m. "The Design and Behaviour of Orthodontic Springs," Norman Wild.

West Lancashire, West Cheshire and North Wales Branch.—Grosvenor Hotel, Chester, 7 p.m. "The Impacted Mandibular Third Molar," Terence Ward.

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